PATENT SPECIFICATION

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371,691

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COMPLETE SPECIFICATION.

Improvements in or relating to Flying Machines.

I, NICHOLAS JOHN MEDVEDEFF, formerly of 5, Edgewood Park, New Rochelle, in the County of Westchester, and State of New York, United States of America, and now of 543E, 132nd Street, County of Bronx, State of New York, aforesaid, a citizen of the United States of America, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The invention relates to a flying machine, the lifting and propelling forces for which are obtained from a utilization of a principle of air-flow dynamics which is known as the Magnus effect. This principle is definitive of the discovery that a rotor, for instance, a cylinder rotating at a high speed in an area of uniform air-flow will generate a force in a direction at an angle of approximately 80° to the air-flow, the magnitude of such force depending upon the velocity of the stream of air and on the ratio of the peripheral velocity of the rotor to the velocity of such air-flow.

The present invention contemplates the provision of a flying machine in which a rapidly rotating cylinder is mounted in a stream of air of high velocity, whereby the force resulting from the Magnus effect is utilized for lifting and propelling the flying machine. Provision is made in my novel flying machine for the furnishing of a uniform air-flow in which revolving cylinders are arranged in such manner that some of them generate a force acting directly upwardly while others generate a force acting in the direction of flight.

Suggestions have heretofore been made as in the case of the British Patent No. 243,755 to Dr. Ing. Marcell Klein that the Magnus effect be utilized as an auxiliary force for the propulsion of land, water, or air craft, but in each instance reliance was placed upon prevailing air currents or air currents established by relative movement as between the exterior atmosphere and the craft to be propelled. The present invention differs from all such prior suggestions in that it supplies by way of means such as powerful pressure blowers a stream which is not only independent of any relative movement as between the flying machine and the exterior atmosphere, but remains uniform with respect to the air channel into which it is directed and to the rotor against which the stream impinges, notwithstanding any alterations in air currents or the speed at which the craft is moving through the air.

In the accompanying drawings, in which a specific embodiment of my invention is illustrated.

Figure 1 is a vertical longitudinal section through a flying machine built in accordance with my invention;

Figure 2 is a section along the line 2—2 of Figure 1;

Figure 3 is a view similar to that of Figure 1 with the parts illustrated in Figure 1 omitted therefrom for the sake of clarity and other parts, not shown in Figure 1, illustrated;

Figure 4 is a section along line 4—4 of Figure 3, and

Figure 5 is a section along line 5—5 of Figure 4.

Referring more particularly to the drawings, in which similar reference characters identify similar parts in the several views, 10 designates the outer casing of the airship which is divided into a passenger and control compartment 11 and a machinery compartment 12 by flooring 13. In the upper compartment are provided accommodations for a pilot and passengers, for instance, seats 14 and 15, 15. The upper portion of the side walls of this compartment may have windows 16, 16, while a door 17 provides means of access to the interior of such compartment.

In the lower compartment 12 are housed the power plant, liquid fuel and oil tanks, pressure blowers and associated air channels and the transmission mechanism for the various pieces of apparatus.

The primary power for my flying machine is supplied by two internal combustion engines 18 and 19 suitably positioned in the longitudinal mid portion of the airship. The oil supply for these internal combustion engines may be stored in a tank 20 and gasolene in the tanks 20a, the latter being preferably positioned

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in the middle of, and at the center of gravity of the ship.

Four pressure blowers 21, 21 and 22, 22, two on each side of the ship, are provided to suck air from the atmosphere adjacent the sides of the airship inwardly as indicated by the arrows in Fig. 2. These pressure blowers which are in the form of the ordinary propellers used on aircraft blow the air against rapidly revolving cylinders 23 and 24 disposed longitudinally of the ship and revolved with their bottom side in a direction opposite to that of the air-flow in which they rotate. The streams of air, one from each side of the ship, having passed the longitudinally disposed cylinders 23, 24, follow the channel 25 which widens at the rear end of the airship into a channel 26. In said latter channel is mounted a transverse cylinder 27, revolving with its rear side in a direction opposite to that of the air-flow. When the stream of air has passed the transverse cylinder 27, it is discharged through the opening 28 into the atmosphere. The air-flow is directed against the cylinder 27 only under conditions of forward flight as the forces according to the Magnus effect are obtained from the revolution of the cylinder in the oppositely flowing air current in a horizontal direction and constitute the propelling force of the machine. When the ship is to start from a position of rest upon the ground and it is desired that it rise vertically from its starting point, this force is eliminated by the by-passing of the stream of air flowing through the channel 25, so that such stream does not envelop the cylinder 27 but is discharged through the lower rear portion of the apparatus as will be more fully described hereinafter.

The transmission of power from the engine 18 to the two propellers on the same side of the machine is effected through a bevel gear 29 mounted on shaft 30 of such engine and meshing with bevel gear 31 on shaft 32 suspended in the bearing 33 and having on the other end thereof sprocket wheel 34 driving sprocket chain 35 passing over sprocket wheels 36 of each of the shafts of the two propellers which the engine 18 is designed to power. As will be seen from Fig. 1, the sprocket chain 35 is an endless chain distributed triangularly over the sprocket wheel 34 and sprocket wheels 36, 36 of the two propellers 21, 21 on the same side of the ship. The power from the engine 19 on the other side of the ship is similarly transmitted through a bevel gear 37 mounted on engine shaft 38 and meshing with bevel gear 39 mounted on one end of the shaft 40 suspended in bearing 41 and having at its other end sprocket wheel 42 over which passes sprocket chain 43 transmitting power to the sprocket wheels 44, 44 on the shafts of the two propellers 22, 22 powered by the engine 19.

On the two shafts 30 and 38 of the engines 18 and 19 are mounted respectively sprocket wheels 45, 46 over which runs a sprocket chain 47 driving a vertical shaft 48 by means of the sprocket wheel 49 mounted at the lower end thereof. On the upper end of the shaft 48 is mounted a bevel gear 50 meshing with a bevel gear 51 on shaft 52. On this latter shaft is mounted a sprocket wheel 53 over which passes a sprocket chain 54 driving the cylinder 24 in the direction indicated by the arrows. On the other side of the bevel gear 50 meshes a bevel gear 55 mounted on a shaft having a sprocket wheel 56 over which the chain 57 passes, rotating cylinder 23 in a direction opposite that in which cylinder 24 is rotated.

The cylinders 23, 24 are longitudinally disposed through the airship in the upper portion of the compartment 12.

On the end of the shaft of cylinder 23 there is mounted a bevel gear 58 meshing with a gear 59 driving the shaft 60 supported by brackets 61, 61 from the flooring 13, of the transverse cylinder 27, thereby driving the cylinder in the direction indicated by the arrow in Fig. 1.

Turning now to a description of the various control mechanisms, when the ship first rises from the ground upon starting it utilizes only the forces obtained from the Magnus effect of the longitudinally disposed cylinders, which forces act directly upward. To accomplish this purpose, i.e. to eliminate the effect of the transverse cylinder, a by-pass mechanism 62 is provided which in its normal position is illustrated in full lines in Fig. 3 and in the starting position of the ship as indicated by dotted lines in said figure. This by-pass mechanism or by-pass valve, pivoted at 63, serves to divert the air-flow when it is desired that the airship rise vertically without forward flight as, for instance, when starting from the ground, from the transverse cylinder, by shutting off the channel 26 and permitting the stream of air flowing through the channel 25 to be discharged through the opening formed when such by-pass mechanism is lifted from its position forming part of the casing 10. When a sufficient altitude has been attained by the flying machine the by-pass valve 62 is permitted to return to its normal position, when the air from channel 25 will pass around the rotating transverse cylinder 27 which will then generate a force directed forwardly and propel the ship in that direction. The valve 62 is hinged on shaft 63, and has

springs 64, 64, forcing the return of said valve into its lower and normal position for forward flight of the ship. To lift the valve 62 so as to shut off channel 26 from channel 25 and therefore the air flow from cylinder 27, a cable 65 attached to a projection 66 of such valve is attached at its other end, after passing over pulleys 67, 68, and 69 to a handle 70 mounted on the instrument board 71. The handle 70 is positioned in a slot from which it may be pulled and when turned 90° may be secured in such pulled-out position upon said board. When thus pulled from its housing in the slot the handle pulls upon the cable 65, causing the by-pass valve 62 to be shifted from the position indicated in full lines in Fig. 3 to the position indicated in dotted lines in said figure. When it is desired that the by-pass valve return to its normal position, the pilot merely turns the handle back to its original position to allow it to be drawn within the slot, when the springs 64, 64 will return the by-pass valve 62 to its position in which its lower side is flush with the casing.

The control of the turning of the ship in a horizontal plane is accomplished by means of two damper plates 72, 73 pivoted at 74 and having projections 75 extending beyond said pivot point. A spring 76 connects each of these projections to the top casing of the channed 25. A cable 77, one end of which is connected to the end projection 75, is passed over pulley 78 to the foot pedal 79. The cable 80 connected to the end projection of the plate 73 runs over pulley 81 to the foot pedal 82. The foot pedals 79 and 82 are mounted on a bracket 83 attached to the casing 10 of the ship, being pivoted in such bracket on a shaft 84. The springs 76 serve to keep the plates 72, 73 in their normal position indicated in full lines in Fig. 3 in which position the full force of the stream of air against the cylinder 27 is obtained equally throughout the length of such cylinder. When the ship is to be turned in the horizontal plane in either direction one of the two pedals 79, 82 is depressed, whereby the damper plate controlled by such pedal is brought into the position against the surface of the cylinder indicated by dotted lines in Fig. 3, in which position the forward force on one-half of the transverse cylinder 27 is destroyed, the remaining force on the other half of the cylinder bringing about the necessary turning of the ship in the horizontal plane. If it is desired to turn the ship to the left, the pedal 79, being the left pedal as the pilot faces the direction of flight, is depressed, whereby a tension is exerted on the cable 77 and the damper 73 is brought against the cylinder 27 as indicated in dotted lines in Fig. 3. When the desired amount of turning has been accomplished the foot pedal is released by the pilot and the spring 85 will return the same to its original position so that the cable 77 will be relaxed. The spring 76 will then return the damper plate 73 to its position in the wall of the channel 26.

In Figs. 1 and 2, I have shown, at the rear sides of the ship, in dotted lines, controlling rudders 130 and 131 for assisting in directing, and in stopping, the ship.

To keep the ship on an even longitudinal keel, i.e. to correct a fore-and-aft tilt of the ship (for instance, when a load has been shifted or to overcome pitching due to uneven air currents) the cylinder 23 is provided with damping plates 86 and 87 and cylinder 24 with similar plates 88, 89. These damping plates are normally held in position by means of coil springs 89a, 89b at their forward and rearward ends respectively. The plate 86 is hinged at 90 and 91; plate 87 at 92, 93; plate 88 at 94, 95 and plate 89 at 96, 97. Turning of these plates toward and away from the respective cylinders is accomplished by means of vertical rods or control sticks 98, 99 mounted on shafts 100, 100, one on each side of the pilot seat 14. A halved rocker arm 101 loosely mounted on shaft 100, has its two parts pivoted on shaft 100, said parts having mounted at their ends gear segments 102 and 103 meshing respectively with pinions 104 and 105. Upon each of shafts 100 is provided a lever 101a fulcrumed on such shaft whereby one or the other of the two parts of said halved rocker arm is depressed, depending upon whether the control stick is pushed forward or backward. When it is desired to dampen the air flow against cylinder 23, the lever 98 is pushed forward by the pilot to the position indicated in dotted lines in Fig. 3, which will rock the corresponding half of the rocker arm about its shaft 100 so that the gear segment 102 will turn the pinion 104. The turning of pinion 104 revolves the shaft 106 upon the end of which is mounted an arm 107, which will depress the damper plate 86 against the cylinder 23 into the position indicated in dotted lines in Fig. 5. When the lever 98 is drawn backward, the turning of the pinion 105 by the gear segment 103 to the same extent in the opposite direction will cause the sprocket wheel 108 mounted on its shaft to revolve and to cause the arm 109 connected to the sprocket wheel 110 by chain 111 to the sprocket wheel 108 to depress the damper plate 87 against the cylinder 23. Control of the damper plates 88, 89 by means of vertical rod 99 through

halved rocker arm 112, lever 101b, pinions 113, 114, sprocket wheels 115, 116, sprocket chain 117, and arms 118 and 119 is accomplished in similar manner. Independent control of the plates 86 and 87 and of the plates 88 and 89 is thus secured.

In view of the fact that the use of the described damping plates destroys part of the total lift of the flying machine by reducing the forces obtained by the Magnus effect, provision is made to increase the speed of rotation of the cylinders as well as that of the propellers by throttle accelerators 120, 121 in such a way that the movement forward as well as rearward of the vertical rods or control sticks 98, 99 and of the foot pedals 79 and 82 will accelerate the engines and therefore the speed of rotation of the cylinders and propellers, thereby increasing the speed of the entire system and restoring the lift to the proper amount.

The amount of lift of the airship is controlled by the throttle 122 conveniently positioned anywhere near the seat of the pilot whereby he may properly control the throttling or acceleration of the engines.

A parachute 123 capable of sustaining the entire weight of the loaded ship is provided and may be conveniently arranged in a compartment 124 provided for such purpose.

Two longitudinally extending inflated rubber shock absorbers 125, 126 may be provided for absorbing the shock in landing. Since my machine is capable of rising and descending vertically on a spot selected for landing, no wheels are necessary.

While I have described a specific embodiment of my invention, it is obvious that various modifications therein, particularly in the arrangement of parts and in the various control mechanisms, may be made without departing from the invention.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A flying machine, the lifting forces for which are obtained from the effect of the impinging of a uniform air flow against a rotor housed within said machine and revolved at a high rate of speed within said uniform air flow.

2. A flying machine, the propelling force of which is obtained from the effect of means supported on the flying machine for creating a uniform air flow independent of relative movement as between the flying machine and the exterior atmosphere and for directing it as a uniform air flow into and through a housing within said machine and in said housing causing the uniform air flow to impinge against a rotor revolved at a high rate of speed within said uniform air flow.

3. In a flying machine an air stream channel, means for creating a uniform air flow independent of relative movement as between the flying machine and the exterior atmosphere and for directing it in the condition of a uniform air flow into and through said channel and a revolving cylinder in said channel in the path of said uniform air flow.

4. In a flying machine, an air stream channel, a plurality of pressure blowers for introducing a uniform flow of air into said channel, and a revolving cylinder in said channel in the path of said uniform air flow.

5. In a flying machine, a chamber longitudinally disposed with respect to the body of said machine a revolving cylinder disposed in said chamber with its axis longitudinally of the body of said machine and apparatus for introducing a uniform flow of air into said chamber transversely of, and against, said cylinder.

6. In a flying machine, a plurality of air stream channels, pressure blowers for introducing a uniform flow of air into such channels, a plurality of revolving cylinders, one in each of said channels and in the path of said uniform air flow.

7. In a flying machine, a chamber disposed longitudinally of the body of said machine a revolving cylinder in said chamber, apparatus for introducing a uniform flow of air into said chamber, transversely of, and against, said cylinder, a second chamber, disposed transversely of the body of said machine, a revolving cylinder in said second chamber, and means for directing a uniform flow of air into said second chamber transversely of, and against, the revolving cylinder therein.

8. In a flying machine as claimed in claim 7, by-pass mechanism adapted to divert the air flow from said second air stream channel and hence from said transverse cylinder.

9. In a flying machine as claimed in claim 7, by-pass mechanism for diverting the air flow from the transverse cylinder comprising a by-pass valve forming in its normal position a part of the casing of said flying machine and which is adapted to be moved from said normal position to a position in which it shuts off the air flow from said transverse cylinder and conducts the same directly to the atmosphere.

10. In a flying machine, a plurality of chambers disposed longitudinally of the body of said machine, a rotor in each of

said chambers revolving at a high rate of speed, apparatus for introducing a uniform flow of air into each of said chambers, transversely of, and against, the respective cylinders a chamber disposed transversely of said machine, a rotor revolving at a high rate of speed in said transverse chamber, said transverse chamber being in communication with said longitudinal chambers, whereby the air flow from said longitudinal chambers is introduced into said transverse chamber transversely of, and against, the rotor revolving therein.

11. In a flying machine as claimed in claim 10, a pair of damper plates for each of the longitudinally disposed rotors, and a pair of damper plates for the transverse rotor.

12. In a flying machine as claimed in claim 10, a pair of damper plates for each of the longitudinally disposed rotors, means for moving said damper plates toward and away from the rotors independently of each other, a pair of damper plates for the transverse rotor, and means for moving said damper plates independently of each other toward and away from said transverse rotor.

13. In a flying machine as claimed in claim 6, means for correcting the fore-and-aft tilting of the machine including a plurality of damper plates adapted to be moved to and away from the surfaces of the cylinders to dampen the flow of air against portions of said cylinders.

14. In a flying machine as claimed in claim 6, a pair of damper plates for each of the cylinders pivoted along one of their longitudinal edges and means for causing said damper plates to be moved towards and away from said cylinders.

15. In a flying machine as claimed in claim 6, a pair of damper plates for each of the cylinders pivoted along one of their longitudinal edges and means for causing either of said damper plates to be moved independently of the other towards and away from said cylinders.

16. In a flying machine as claimed in claim 7, means for controlling the turning of the machine in a horizontal plane, including a pair of damper plates for the revolving cylinder in the transverse channel adapted to be moved to and away from the surface of said cylinder, independently one of the other, to dampen the flow of air against a portion of said cylinders.

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[This Drawing is a reproduction of the Original on a reduced scale]

Fig. 1.

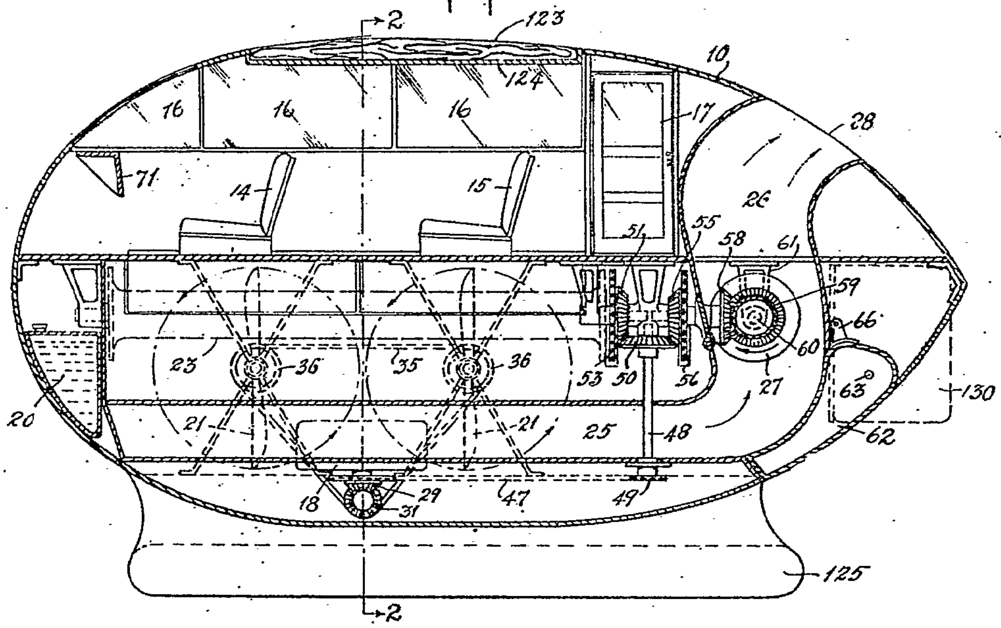


Fig. 2.

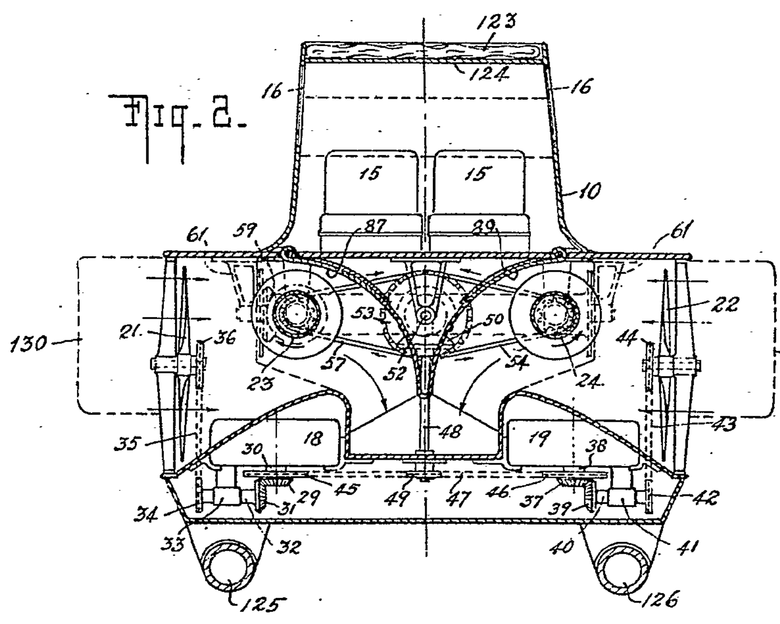


Fig. 3.

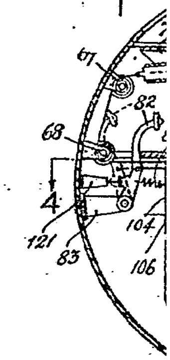


Fig. 4.

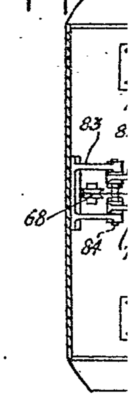
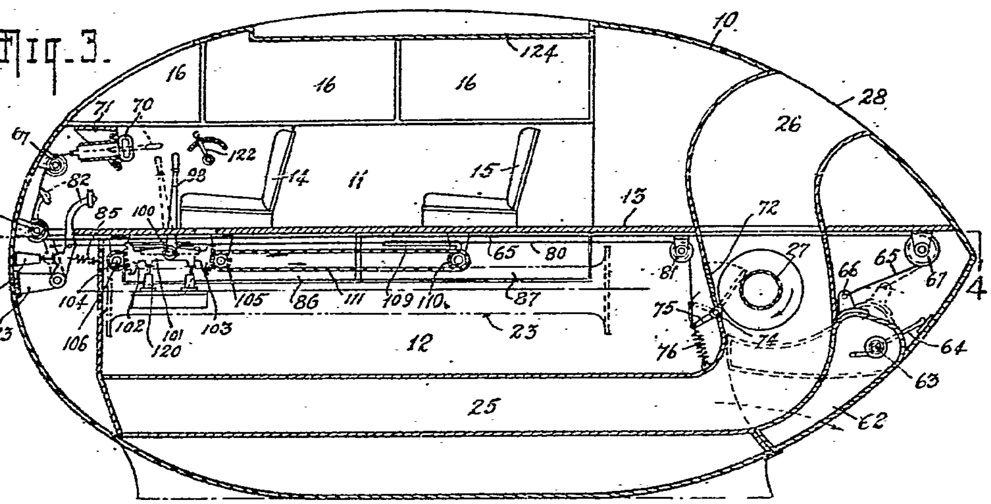


Fig. 3.



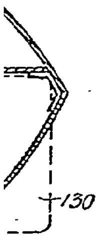


Fig. 4.

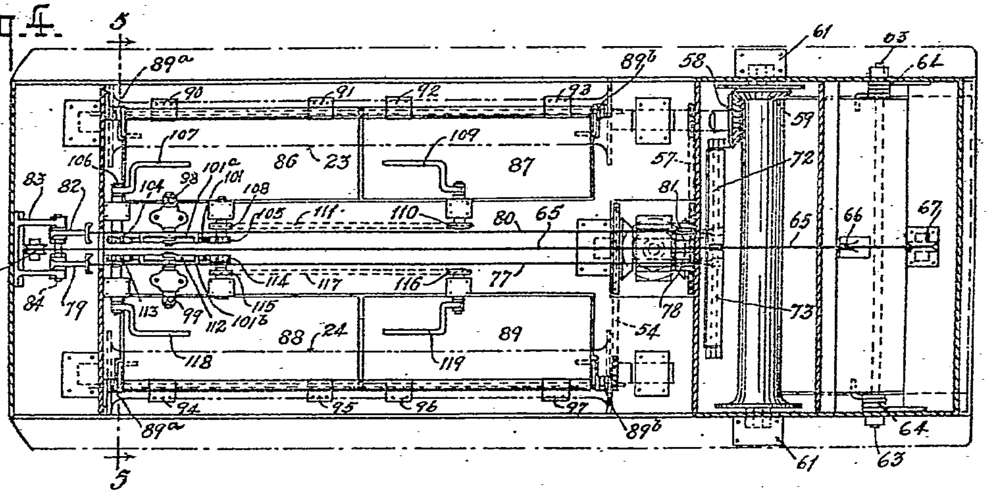


Fig. 5.

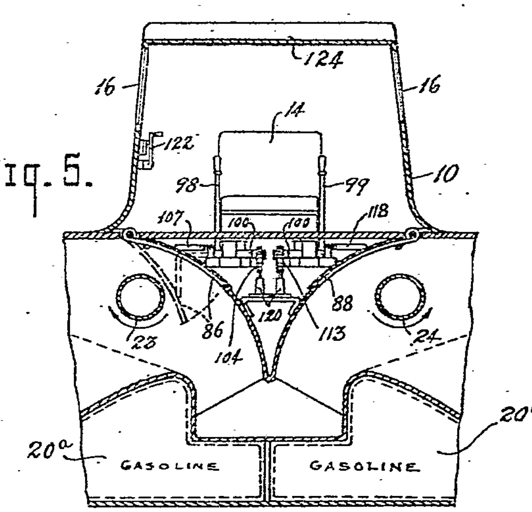


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Fig. 1.

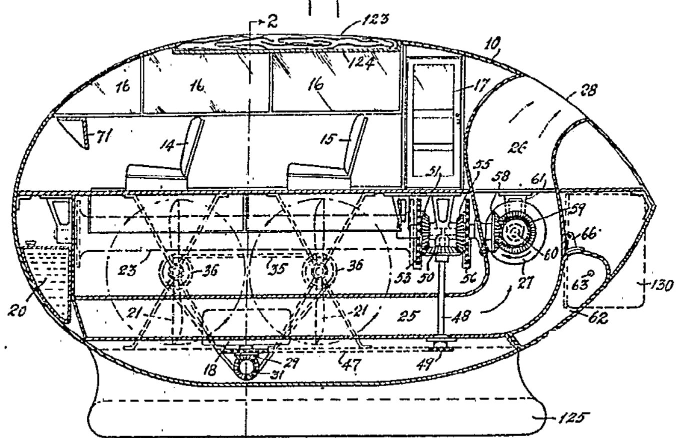


Fig. 2.

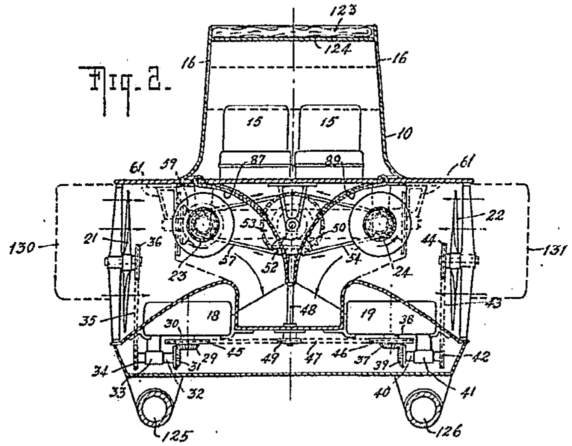


Fig. 3.

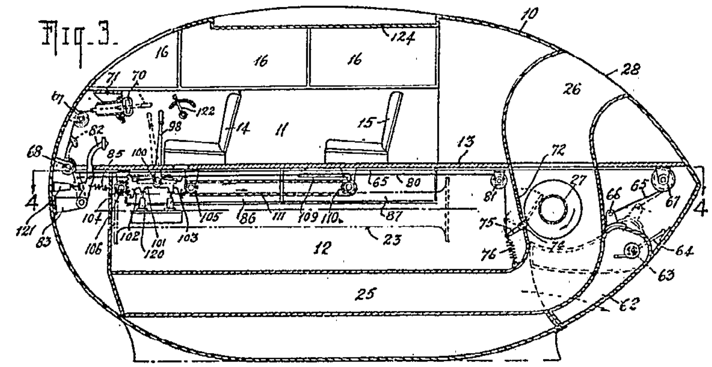


Fig. 4.

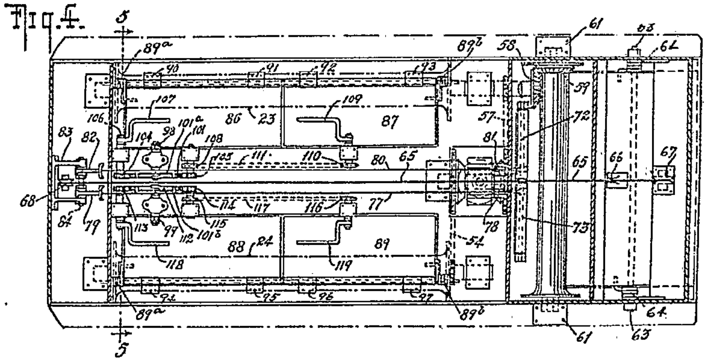
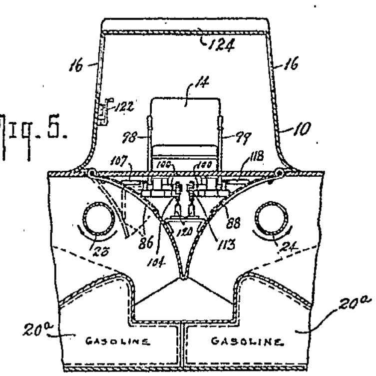


Fig. 5.



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